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AUTHOR Clark, Catherine P.
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ABSTRACT

Texas school district fiscal response to a state-level call for increased emphasis on technology is examined. The response, in this instance, is budgeted expenditures on a per-student basis on computing and data processing for the 1988-89 school year. Response is investigated as a function of district characteristics such as wealth per student, size, and operating costs per student, and also as a function of student demographics. The report presents an analysis of school district budget reports for the 1988-89 school year from a state-wide public education data system and concludes that fiscal equity may be achieved at the state level if reforms are built into the current system. However, additional technology-directed dollars may not reach districts with the greatest technological needs. A categorical program of technology financing would be likely to reduce equity, especially if funding is directed to districts with substantial high-risk student populations. A recommendation is made for a balanced approach that includes equalized resources, block grants, and pilot project funds. Five statistical tables are included. (18 references) (LMI)

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Catherine P. Clark

TEXAS CENTER FOR EDUCATIONAL RESEARCH
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LINKING EDUCATIONAL FINANCE REFORM AND EDUCATIONAL TECHNOLOGY REFORM IN TEXAS

Catherine P. Clark, Ph.D.*

This study investigates Texas school district fiscal response to a state-level call for increased emphasis on technology. The response, in this instance, is budgeted expenditures (calculated on a per-student basis) on computing and data processing for the 1988-89 school year. The investigation explores responsiveness as a function of district characteristics such as wealth per student, size, and operating costs per student. It also compares district responsiveness as a function of student demographics. The purpose for the former approach is to relate technology expenditures to school finance reform as currently discussed in Texas under the constraints of the Edgewood I.S.D. v. Kirby lawsuit. The latter approach is to relate the expenditures on technology to the instructional areas in which technology is said to have great potential, namely for instruction of minority and low-income students.

State Policy on Technology in Education

Texas law has for several years contained provisions dealing with educational technology. Legislation requires (1) financial assistance for computer services offered by regional education service centers,[1] (2) establishment of a Software Advisory Committee to recommend a process for distributing information about quality software,[2] (3) development and adoption of a Long Range Plan for Technology,[3] (4) preparation of a Long-Range Plan for Information Systems.[4] State Board of Education rules require students to take a one-semester course in computer literacy in the seventh or eighth grade, elementary school keyboarding instruction, and school district technology implementation plans.

The Texas State Board of Education, with assistance from the staff of the Texas Education Agency, prepared and adopted the Long-Range Plan for Technology in December 1988. Realizing that education, technology, and the economy are interdependent, the Board determined that "technology must be integrated into education, both as a field of study and as a means of delivering instruction."[5] Research reveals a high potential for technology to address several educational and social problems. The plan views technology as a "component in a broad effort" to address problems in our schools by increasing efficiency and productivity and by providing high-quality instruction.

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*Catherine Clark is the Assistant Director for the Texas Center for Educational Research, Austin, Texas. The author gratefully acknowledges the assistance of Michelle Kretzschmar in preparing the data for analysis.

The State Board's Long-Range Plan identifies minimum attributes of technology use in five areas: student workstations, teacher workstation modules, administrator workstations, open-access learning centers, and telecommunications centers. The goal for the year 2000, according to the plan, is to have student access to workstations for 7.5 hours a week, teacher and administrator access to workstations for 30 hours a week, all districts with telecommunication centers, and nine-out-of-ten districts with open-access learning centers. The overall cost would be over $1 billion in current dollars.[6] Initial implementation for the 1990-91 biennium was estimated to cost over $16 million. The legislature instead appropriated $6 million for the biennium for what is known as the Technology in Education Act of 1989.[7]

The 1989 legislation provides for statewide development of technology, information networks, and telecommunications for schools. Stated in the legislation itself is the purpose: to prepare Texas for the twenty-first century by providing a quality education system in which every student has access to a comprehensive curriculum that provides the basis for a quality education. Education, the Legislature says, "must utilize in a comprehensive manner appropriate technology in all aspects of instruction, administration, and communication."

To achieve this purpose, the legislation mandates several activities:

- The state must establish and maintain an electronic information system.
- The State Board of Education and others must maintain and expand the integrated telecommunications system.
- The State Board of Education will set up an independent Center for Educational Technology.
- The state will make a comprehensive inventory of technology systems in use in public schools.

Electronic Information System for Public Education. Texas has begun to establish an electronic information transfer system that can transmit information among school districts, education service centers, the Texas Education Agency, and other educational organizations the State Board of Education identifies. Using this system, educators may access electronic bulletin boards, participate in computer conferences, send electronic messages, and examine various information sources.

Integrated Telecommunications System for Public Education. The envisioned integrated telecommunications system will be a network of several systems--existing and new--that will deliver services to schools. This hybrid system of satellite, telephone, cable TV, UHF-VHF, and other transmission media will provide technical assistance from state agencies, staff development seminars and workshops, electronic publishing, distance learning for students and teachers, and downloading of computer courseware and textbooks.

To strengthen the role of technology in teaching and learning, the Technology in Education Act of 1989 authorizes the State Board of Education to establish demonstration programs to investigate the uses and effects of technology.

Finally, the law gives the State Board of Education responsibility to adopt guidelines or standards for the quality, technical specifications, and other features of hardware, software, training, and other technology-related products and services.

The impact of this comprehensive legislation will vary from district to district. Some Texas districts are recognized leaders in their effective use of technology; other districts are just getting started. Almost all districts have financial and personnel issues to resolve as they respond to the new requirements.

Technology in Texas School Districts

In 1989, the Texas Center for Educational Research conducted a survey that revealed a wide range of technology utilization in Texas school districts.[8] The statewide average ratio of students to computers is about 23:1 with high-wealth districts leading the way in low student-to-computer ratios of 10:1 and below. About a third of the surveyed districts report using CD-ROM technology for instruction in some classes. Nearly one in five experiment with videodisc machines. In most schools, computers are clustered in laboratory arrangements while VCRs, CD-ROMs and other equipment are shared the way AV equipment was a decade ago. District use of distance learning arrangements tends to focus on teacher and administrator in-service programs. All districts surveyed are connected to cable or traditional television sources, but very few use it for course delivery to students.[9]

Administrative computing and data processing are used "for most district operations" in 87 percent of the survey group. In addition, one in three districts uses outside data processing services for some functions. Nearly all Texas school districts are connected with an electronic information service from GTE called Electric Pages and a network from the state education agency but few extend these resources to the campus level.

Expenditures on Computing and Data Processing

School district budgeted expenses reported through the Texas Public Education Information Management System (PEIMS) data system are the subject of this study. Data from the 1988-89 school year are available at this time from the Texas Education Agency. All data are reported in terms of budgeted expenses per ADA. While a

comprehensive file of budgeted education expenses is a welcome new resource for Texas analysts, the data present some problems.

First is the matter of classification at the local level. Districts exhibit quite a bit of flexibility when they draw up budgets, making it difficult for the state, or an analyst looking at data, to make unequivocal statements about budgeted expenses. One district may classify a teacher who works three-quarter time in a computer lab as "instructional personnel." Another district may distribute that teacher's payroll cost across budget categories, three-quarters to instructional computing personnel and one-quarter to instructional personnel. The net result of differences in assigning costs to budget categories is that, given state-reported budget data, some districts may appear to spend less on instructional computing and data processing than they really spend.

A second problem is more general. Without an established definition of technology, it is hard to report with assurance expenditures on "educational technology." Technology today covers a wide range of expenditure objects and functions. For example, districts may report telecommunications (cable TV, a satellite dish, television monitors) in administration, in a capital budget, in instruction, or across several categories. Without examining individual district budget detail it is impossible to determine the extent of all resources for technology.

This analysis includes five budget categories: instructional computing, data processing management, data processing computer programming, data processing development, and data processing interfacing. For convenience, the last four are aggregated to form a "DP" category; thus the analysis features budgeted expenses for instructional computing and DP.

Table 1 shows the average expense per student on instructional computing and DP. Student counts were about 3 million (ADA rather than enrollment) meaning that school districts across Texas spent about $70 million on instructional computing and $39 million on data processing. Overall, Texas school districts' expense on instructional computing and DP was about one percent of all expenses--about what Texas spends annually on textbooks.

Table 1
Budgeted Expenditures Per Student
1988-89

	Instructional Computing	DP
Average Expense per student	$ 23.25	$13.01
% of Total Expense	.64	.34

Table 2 displays instructional computing and data processing budgeted expense according to district size categories. Table 3 displays budgeted expense by district wealth. The six largest districts and the 416 smallest districts budget the largest expense per student for instructional computing. Large districts have the biggest DP budgets. The U-shaped instructional computing budget pattern is revealed in Table 3. The very poorest and the very wealthiest districts budget more for instructional computing. Districts near the average wealth mark ($200,000/ADA) have budgeted instructional computing expenses 60 percent lower than the poorest districts. There is no apparent pattern relating budgeted expense for DP with property wealth.

Table 2
Instructional Computing and by DP
by District Size

N	District Size ADA	Instructional Computing/ADA	DP/ADA
6	50,000 +	$25.07	28.16
14	25,000 - 49,999	21.23	17.92
44	10,000 - 24,999	17.91	13.00
43	5,000 - 9,999	19.85	7.59
89	3,000 - 4,999	23.16	5.92
111	1,600 - 2,999	26.70	3.09
133	1,000 - 1,599	31.08	4.84
205	500 - 999	32.26	2.28
416	Under 500	36.59	4.23

Table 3
Instructional Computing and DP
by District Wealth

N	Wealth Range	Instructional Computing/ADA	DP/ADA
105	Under 83,571	$28.70	$8.60
106	$83,571 - 102,656	27.43	3.88
105	$102,657 - 118,605	22.41	1.67
106	$118,606 - 138,861	16.89	12.50
105	$138,862 - 160,384	19.57	10.95
106	$160,385 - 187,118	17.00	9.69
106	$187,119 - 229,888	17.57	11.80
105	$229,889 - 289,605	30.84	19.28
106	$289,606 - 448,018	19.84	21.05
105	Over $448,018	36.33	7.73
705	Below average	21.45	9.16
350	Above average	25.47	18.32

Table 4 displays budgeted expense by district type. Suburban districts of other central cities have the highest budgets per student for instructional computing. Rural districts (44 percent of the total) also budget well above the average per student expense for instructional computing. Major urban districts (they are also the largest in terms of ADA) budget over twice the state average on DP. In both administration and instructional computing rural districts appear to be making a strong effort if effort is measured by budgeted expenditures per student. The high DP expense for very large and very small may also reflect the U-shaped cost curve often associated with scale economies in delivering educational services.

Table 4
Instructional Computing and DP
by District Type

N	Type	Instructional Computing/ADA	DP/ADA
8	Major urban	$24.56	$27.48
60	Major suburban	14.55	14.23
23	Other central city (cc)	21.21	12.96
73	Other cc suburban	35.80	6.51
65	Indep. town	18.59	5.79
116	Non-metro fast grow	26.23	3.34
248	Non-metro stable	31.59	3.90
468	Rural	35.42	21.30
	Average	23.25	12.28

Table 5 completes the review of information on district characteristics with a summary of instructional computing and DP budgeted expenses according to operating costs per ADA. Resources for instructional computing are directly and positively related to operating costs. In contrast, DP expenses per student are not directly related to operating costs.

Table 5
Instructional Computing and DP
by Operating Costs/ADA

N	Cost/ADA	Instructional Computing/ADA	DP/ADA
212	Under $3,297	$16.24	$7.09
213	$3,297-3,592	18.38	12.47
212	$3,593-3,976	34.12	14.97
212	$3,977-4,720	20.89	16.73
212	$4,720+	44.48	6.94

Tables 6 and 7 display budgeted expense per student for instructional computing and DP as a function of percent minority and percent low-income students (as

measured by students who qualify for free and reduced-price lunches). Instructional computing expense shows greater budgeted expenses for districts with low and high minority enrollment. In Texas, minority enrollment counts are high in large and urban districts.[9] Tables 2 and 4 show above average instructional computing and DP budgets in these districts.

The relationship between percent low-income students and budgeted expense for instructional computing is positive. The correlation between the variables is .47. However, no pronounced relationship appears between DP budgeted expense and low-income enrollment.

Table 6
Instructional Computing and DP
by Percent Minority

N	Minority %	Instructional Computing/ADA	DP/ADA
125	Under 5%	$22.93	$3.10
122	5% - 10%	24.43	6.89
206	10% - 20%	20.08	9.76
137	20% - 30%	20.95	14.56
222	30% - 50%	20.06	9.79
249	50% +	26.03	16.04

Table 7
Instructional Computing and DP
by Percent Low-Income

N	Low Income %	Instructional Computing/ADA	DP/ADA
168	Under 20%	$19.20	$13.72
224	20% - 30%	20.09	8.08
219	30% - 40%	15.31	7.83
277	40% - 60%	32.61	21.24
114	60% - 80%	23.86	10.30
59	80% +	29.55	8.75

Funding Technology and Educational Finance Reform in Texas

Texas must respond by May 1, 1990, to a ruling by the Texas Supreme Court that the school finance system is unconstitutional.[11] The court embraced a fiscal neutrality standard of equity calling for a direct relationship between local district tax effort for schools and revenue for education.[12] The task of the state is to fashion a school finance system that results in substantially equal yield for equal effort and that severs the relationship between revenue and wealth.

At the same time that the court is calling for reform, policymakers are seeking increased accountability and efficiency from the schools. Business groups are calling for restructuring and an infusion of technology to develop employment-ready workers for the next century.[13] Efficiency, access to technology training, and accountability through reporting can be addressed, in part, by instructional computing and data processing functions. The State Board of Education in its long-range plan recommends more funding for technology and incentives for expanding the use of technology in school districts. Legislation proposed for the 1990 special session on education also calls for technology funding.

The problem for Texas in the early 1990s is finding the revenue and introducing it into the system so as to enhance equality and program reform. Court-directed finance reform will take one of two paths: (1) leveling-down with little or no new state aid or (2) substantially increased funding to raise the state's share of the overall finance system.[14] Legislative reform directed at technology in the schools can take many forms. What finance reformers and educators both fear are reform mandates without equalized state funding that increase reliance on the local property tax and exacerbate the inequities in the system.

If Texas raises new state revenue for education, the dollars could flow as equalized general aid to districts or they could be targeted to reform goals such as enhancing technology. However, in drawing the connection between finance reform and technology reform, the analysis here is only partly helpful. Low and moderate wealth districts, the likely recipients of additional equalized state aid, will not necessarily direct new revenue to technology for instruction or data processing. (In fact, it is not clear that these districts as a group are under budgeting in these areas.) Even though the correlation between district wealth per student and instructional computing is strong at .61, Table 3 shows 211 low-wealth districts with relatively large per-student instructional computing budgets. With additional revenue the districts with wealth between $100,000 and $200,000 may be able to budget more for technology. The best assumption to make is that increasing revenue will put an opportunity before some districts.

The state's budget data for school districts does not offer strong support for the idea that low-wealth districts don't have technology because they can't afford it.

Budgeted expense for technology in low-wealth districts is not uniformly low. These districts struggle to finance technology and most other activities using local tax revenues.

In summary, districts that budget expense for instructional computing above the average are very large or very small, are very poor or have above average wealth, have high operating costs, and are located in suburban, rural, and stable-enrollment non-metropolitan areas. Very large and urban districts budget above-average expense on DP as do above-average wealth districts.

The U-shaped budgeted expense in instructional computing may be reflective of scale economies among school districts. Small and rural districts budget more per student just as large urban districts do. U-shaped cost curves have been detected in other studies of Texas district budget and expenditure data.[15]

Directing Technology to Specific Student Populations

At-risk student populations are characterized by a lack of basic skills, poor attendance, and low graduation rates. Minority at-risk students in Texas face even greater risks of failing to complete school and attain basic skill requirements.[16]

Technology tools may be able to help ameliorate the problems associated with educating at-risk students. Technology can help identify and monitor such students so that intervention can occur earlier in the educational process. Computer-aided instruction can help diagnose and remediate learning disabilities while self-paced instruction using computers may motivate students and bring skills up to grade level. Computer-assisted instruction has been found effective for helping disadvantaged students practice basic skills.[17] Technology alone won't solve the educational problems of low-income and minority at-risk students, but research has established that it is a good tool in a comprehensive approach.[18]

Texas school districts with 50 percent or more minority students budget the largest expense for instructional computing and DP. These 249 districts comprise about 20 percent of total enrollments. Table 7 showed that districts with larger low-income enrollments (40 percent and more) budget more for instructional computing and DP. Minority and low-income students are concentrated in large, urban districts--districts that Tables 2 and 4 showed budgeting more for technology.

From the PEIMS data for 1988-89, it appears that Texas school districts are directing technology toward students that research indicates need it the most, though this fact appears to arise not from policy design but for other reasons such as district size and location. Large urban districts are above-average in wealth and, therefore, not likely to enjoy increased revenues as a result of finance reform to meet Edgewood

I.S.D. v. Kirby. If the state determines that it is good policy to direct technology toward districts serving high concentrations of low-income and minority students, then it may need to find a mechanism other than the finance formula to achieve this goal.[19]

Alternatives for Financing Technology

Providing state revenue for technology through a highly equalized school finance system may not achieve state policy goals to infuse technology into schools, particularly those serving at-risk students. Reform in 1990 is likely to result in reduction of revenue (or, at best, no new revenue) to large urban districts to wealthy small districts, and to rural districts. While already budgeting above average for instructional computing and DP, these districts may need to maintain or increase budgeted expenses in order to meet the needs of special student populations. They may have difficulty accomplishing this once reform is enacted.

Other financing options are available and may help Texas achieve its goal of integrating technology as a field of study and as a means of delivering instruction.

Through the School Finance Formula. To offset the impact of reform, student technology weights could be established to provide for the costs of providing some types of technology. In this way, urban and large districts with high concentrations of at-risk students may be able to maintain or enhance their technology efforts.

In addition a grant for technology could be established as an add-on to the state program after the state share of the total program is calculated. Or the grant could be included as part of the basic program and equalized through a foundation program or guaranteed yield finance plan.

Through the Permanent School Fund (PSF). This endowment's earnings are required to be apportioned to school districts on a per student basis. The state could use some or all of PSF earnings for technology purposes. This type of distribution would not enhance equity and would reduce the PSF revenues going for other educational purposes, but it would target expenditures to technology and enable the state to fulfill some of its long-term plan objectives.

Textbook Funds. Texas provides free textbooks to all districts. Educational software, if classified as "textbooks," could be distributed by the state in a similar manner. Using such a mechanism would, however, provide little direction concerning technology use except as an incentive to use equipment compatible with software on the state list.

Innovative Funding. Demonstration programs, performance grants, and waivers of state requirements for innovative technology programs have been suggested as incentive programs to encourage districts to explore and adopt technology.[19] Projects such as these would be small in scale and separate from finance equity reforms.

In Conclusion

Texas is wrestling with how it should finance and encourage technology reform in the state. If the reforms are built into the current system (or a refined version of the current system that moves toward the court-based equity standard) then the state is likely to achieve more fiscal equity but the additional technology-directed dollars may not flow to districts with the greatest need to catch up in the technology area. Demonstration programs and incentives for districts outside the finance formula usually represent trivial sums in comparison to the calculated needs for technology (over $100 million per year). A categorical program of technology financing would be likely to reduce equity, particularly if the dollars are directed to districts with concentrations of high-risk students. A balanced approach to technology funding with equalized resources, block grants, and demonstration or pilot project funds would better help Texas reach its long-range plan goals.

NOTES

1. Texas Education Code, Chapter 11, §11.33(b)(1).

2. Texas Education Code, Chapter 14, §14.001-14.004.

3. Texas Education Code, Chapter 14, §14.021.

4. Vernon's Texas Civil Statutes 4413 (32h), §2.08.

5. Texas State Board of Education, Long-Range Plan for Technology (Austin: The Board, 1988), p. 12.

6. The Alliance for Technology, "Technology Plan for Texas Education" (Austin: Texas Association of School Boards, 1990).

7. C.S.S.B. No 650, by Parker. An Act Relating to Technology and Telecommunications in Public Education, 1989.

8. Catherine Clark and John Swinton, "Technology In Texas School Districts" (Austin: Texas School Services Foundation, 1989), pp. 2-3.

9. Ibid.

10. "Research Briefs," Issue 90.1 (Austin: Texas Education Agency, Department of Records and Development, 1990), p. 1, 6, 12.

11. Edgewood Independent School District, et al. v. Kirby, et al. Cause No. C-8353 (Texas Supreme Court, October 2, 1989), to be reported.

12. Billy D. Walker, "What Did the Supreme Court Say in Edgewood I.S.D. v. Kirby?" (Austin: Texas Center for Educational Research, 1989).

13. Texas Chamber of Commerce, "Texas Business and Education Coalition" (Austin: The Chamber, 1989).

14. Billy D. Walker, "Briefing Paper: Texas Public School Finance and Related Issues" (Austin: Texas Center for Educational Research, 1990).

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16. Lyndon B. Johnson School of Public Affairs, Education, Technology, and the Texas Economy, Vol. 2, "Can Technology Help Texas Public Schools?" Policy Research Project Report Number 85 (Austin: L.B.J. School of Public Affairs and the Texas Education Agency, 1989), p. 9-10.

17. Henry M. Levin, Educational Reform for Disadvantaged Students: An Emerging Crisis (Washington, D.C.: National Education Association, 1986) p. 27.

18. Andrew Hahn and Jacqueline Danzberger, Dropouts in America: Enough is Known for Action (Washington, D.C.: Institute for Educational Leadership, 1987), p. 261.

19. L.B.J. School of Public Affairs, Education, Technology, and the Texas Economy, pp. 102-105.

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